Challenges for Next Generation Network Operations and Service Management: a Report on APNOMS 2008

**James Won-Ki Hong · Luoming Meng ·
Young-Tak Kim · Hiroshi Uno · Shingo Ata ·
Yan Ma · Deokjai Choi**

Abstract   This article presents a report on APNOMS 2008, which was held October 22–24, 2008 in Beijing, China. The theme of APNOMS 2008 was "Challenges for Next Generation Network Operations and Service Management."

J. W.-K. Hong (✉)
POSTECH, Pohang, Korea
e-mail: jwkhong@postech.ac.kr

L. Meng · Y. Ma
BUPT, Beijing, China

L. Meng
e-mail: lmmeng@bupt.edu.cn

Y. Ma
e-mail: mayan@bupt.edu.cn

Y.-T. Kim
Yeungnam University, Daegu, Korea
e-mail: ytkim@yu.ac.kr

H. Uno
NTT, Chiba, Japan
e-mail: uno@ansl.ntt.co.jp

S. Ata
Osaka City University, Osaka, Japan
e-mail: ata@info.eng.osaka-cu.ac.jp

D. Choi
Chonnam University, Gwangju, Korea
e-mail: dchoi@chonnam.ac.kr

1 Introduction

The 11th Asia-Pacific Network Operations and Management Symposium (APN-OMS 2008, http://www.apnoms.org/2008/) was held on October 22–24, 2008 in Beijing, China. This was the first time an APNOMS was held in China. APNOMS 2008 was organized by IEICE ICM (Institute of Electronics, Information and Communication Engineers, Technical Committee on Information and Communication Management) and KICS KNOM (Korea Information and Communications Society, Korean Network Operations and Management Committee) with support from IEEE CNOM (Committee on Network Operations and Management), IEEE APB (Asia Pacific Board), Beijing University of Posts and Telecommunications (BUPT), China Institute of Communications (CIC), TC7 of China Communications Standards Association (CCSA), and IFIP WG 6.6. APNOMS 2008 continues to play an important role for exchanging and discussing all aspects of telecommunications management among the academic community and the telecommunication industry at large in the Asia-Pacific region. As in the previous APNOMS symposia [1–10], APNOMS 2008 was a great success, attracting over 170 researchers, practitioners, service providers, and vendors from 14 countries. In the opening plenary session, General Co-Chairs, Prof. James Hong and Prof. Luoming Meng, welcomed the attendees to APNOMS 2008. The welcome addresses were followed by opening remarks which were delivered by two special guests, Dr. Doug Zuckerman (IEEE Comsoc President), and Mr. Deqiang Zhou (Chairman of China Institute of Communications). Dr. Zuckerman emphasized the role of ComSoc's CNOM in the organization of APNOMS from its birth and in promoting the globalization of ComSoc activities for its members around the world. Mr. Zhou briefly explained the growth of ICT industry and services in China and emphasized the importance of symposiums such as APNOMS to share visions, innovative ideas, practices and experiences.

The theme of this symposium was "Challenges for Next Generation Network Operations and Service Management." Research and development on Next Generation Networks (NGNs) have been carried out over the last few years and we are already seeing their deployment and operations in many parts of Asia–Pacific countries. We are also beginning to experience new and interesting services that utilize these NGNs. We are certain that we will see more deployment of NGNs and NGN services in the next few years. Thus, the operations and management of NGNs and their services are very important to the network operators and service providers. At the same time, they are also concerned about new and more effective ways of performing the operations and management.

As synopsized below, the APNOMS 2008 had prepared an excellent 3-full day program with keynotes, tutorials, special sessions, panels, technical sessions, poster sessions, innovation sessions and exhibitions with the theme in mind. This year we have received 198 submissions of technical papers and we are certain that the selected 43 technical papers are high-quality treatises on the latest hot topics in next generation network operations and service management.

2 Tutorials

The symposium started with four tutorials covering the latest hot topics. Charlie Yang (AT&T, USA) gave a tutorial on "IPTV Service Assurance Vision." Masatoshi Suzuki (KDDI R&D Laboratories, Japan) gave a tutorial on "Integrated All-IP Network Architecture and Management Technology of FMBC Services for NGN." Qiliang Zhu (BUPT, China) gave a tutorial on "Customer-Centric Service Convergence." John Strassner (Motorola Labs, USA) gave a tutorial on "Building Next Generation Networks Using Autonomic Mechanisms: Theory and Practice." They attracted many participants and generated discussions on the issues of managing NGN technologies and services. According to the tutorial evaluation carried out the audience, all four tutorial topics were accepted to be the hottest topics in the industry today. Out of the four tutorials, John Strassner's tutorial was most well attended and their evaluations were in overall the best as well.

3 Keynotes

Four keynote speakers shared their visions at the symposium. Prof. Hualin Qian (China Academy of Sciences, China) delivered a speech on "Issues on Internet Architecture," stressing the problems with the current Internet and introduced a new architecture for the future Internet. He emphasized that the routing is the reason that the current Internet is so complicated and the new architecture tries to replace the routing with the switching. Mr. Tae Il Park (KT, Korea) gave a speech on "A Key to Survive: Service-oriented Operation and Management for Accelerating Business Transformation." He introduced the KT's latest strategy for the business transformation. Prof. Masayuki Murata (Osaka University, Japan) gave a speech on "Manageability Towards New-Generation Networks: NICT's Approach," and he introduced the strategy of re-design of the network architecture for new generation network (NWGN). He also introduced the AKARI project as an example of new generation network architecture. Mr. Lintao Jiang (China Academy of Telecommunication Research, China) gave a speech on "Current and Upcoming Development in Network Technology," and he emphasized that the Internet and telecommunication networks are at a crossing point for development, and that the progress in both Internet and telecommunication network gave birth to the NGN technology.

4 Technical, Short and Innovation Sessions

The main body of the Symposium consisted of ten technical sessions, two short paper sessions, and two innovation sessions. 43 paper submissions were selected as full papers with oral presentations in the technical sessions and 34 submissions were selected as short papers with poster-style presentations.

Accepted papers and posters represented the latest results of research and development in the operations and management of converged networks and

services, covering research areas including: Routing and Topology Management, Fault Management, Community and Virtual Group Management, Autonomous and Distributed Control, Sensor Network Management, Traffic Identification, QoS Management, Policy and Service Management, Wireless and Mobile Network Management, and Security Management. Many papers focused on the management of broadband wireless access networks and network security. Especially, this year, QoS and Security Management sessions were the most attractive. Participants have discussed actively on attack traffic detection and its related topics. Also, traffic identification is also a hot topic in this symposium. Out of the ten technical sessions, the following sessions had the largest audience size indicating the importance and popularity of the topics: QoS Management, Wireless and Mobile Network Management and Security Management.

Also, the Innovation Sessions were organized to present and to discuss ongoing research, work-in-progress ideas, practical solutions, experimental studies, and various topics of interest to the community. Nine papers were selected and presented in the innovation sessions, which include a prototype of RFID pair detecting, policy-based QoS management framework, VoIP QoS monitoring, visualization-based support system for network operations, and technique for remote management behind NAT routers.

5 Special Sessions

Two special sessions were held on the second day and the third day of the symposium. Eight representatives of various countries from Asia–Pacific discussed "Emerging Issues in China" and "International Emerging Issues." Subin Shen (NUPT, China), Makoto Takano (NTT West, Japan), and Won-Kyu Hong (KT, Korea) were the organizers of these sessions.

On the second day, four speakers from China gave talks on current activities on emerging issues in China. Ping Zhao (China Telecom, China) gave a talk on "NGN OSS Requirements," and discussed requirements (such as customer experience management and service management) for the future NGN OSS. He emphasized especially that the Customer Experience Management (CEM) would become critical in NGN management and operation. Yewen Li (China Mobile) gave a speech on "Pilot NGN Project and Management Strategy in China Mobile," and introduced the China Mobile's plan for transition to NGN. James Yang (UT Starcom, China) gave a talk on "NGN Service Management in Telco Web 2.0 Ecosystem." He introduced key management issues such as collaboration, virtualization, and flexible access with Telco Web 2.0. Zhi-li Wang (BUPT, China) gave a speech on "Overview of ITU-T SG4 Work on Network Management," and introduced the current activities such as designation and information exchange, QoS/QoE measurement managements, NGN appointment management, and security management on management of telecommunication services and networks for NGN at ITU-T SG4.

On the third day, four other speakers gave talks on international emerging issues. Hyunmin Lim (KT, Korea) gave a talk on "Holistic Approach to Define Service

Quality Indicators and Develop ISQM System," and introduced the IPTV service quality indicator for new integrated quality management. Ryozo Ito (HP Japan, Japan) gave a talk on "New Value Chain through Service Platform," and presented technical and business challenges in the service delivery platform (SDP). He presented that open framework for easy collaboration, new value creation are the keys to make success the platform business. Rocky Chang (The Hong Kong Polytechnic University, China) gave a talk on "Lessons learned from the Beijing Olympic Games Website Measurement," and presented the comparisons of different tools for network performance measurements. Chung-Hua Hu (Chunghwa Telecom, Chinese Taipei) gave a talk on "Operations Support for IPTV Service Assurance—Practical Experience and Lessons Learned," and presented the QoS/QoE monitoring techniques in IPTV service.

6 Exhibitions

The exhibition program provided an opportunity for vendors and service providers to exhibit their latest OSS technologies, tools, platforms, products and systems. This program also provided an excellent environment for operators, researchers and academics to interact with vendors. Two companies including NTT Comware, Japan and KT, Korea participated in the exhibition program. NTT Comware demonstrated their MPLS Network Health Check Management System and KT demonstrated their Global OSS Solution.

7 Distinguished Experts Panel

APNOMS 2008 ended with a very exciting distinguished experts panel (DEP) on the symposium's theme of "Challenges for Next Generation Network Operations and Service Management." Chaired by Qiliang Zhu (BUPT, China), and including five panelists, Gang Chen (China Mobile Group Shanxi, China), John Strassner (Motorola Labs, USA), Doug Zuckerman (Telcordia, USA), Xingchen Lu (Textronix Communications, China), and Masayoshi Ejiri (Studio IT, Japan). The DEP panelists discussed and debated a large range of issues including "Methodology Convergence", "Thoughts on Management Challenges for NGNs and the Future Internet," "Challenges for Next Generation Operations and Service Management—Optical Control Plane," "The Role of Probe-Based Monitoring in Next Generation Network and OSS," and "Challenge for Next Generation Network Operations and Service Management."

Facing the challenges for Next Generation Network Operations and Service Management, the most important thing is the paradigm shift from the network-centric to the customer-centric views. Based on that, the following topics were discussed: e.g., what are the services for NGNs, who and how to develop and deliver these services, and how to build and manage the NGNs. Some of most interesting discussions were generated:

– The new connotation of "customer-centric" is that the customer's role has shifted from the consumer to the prosumer by actively involving in the value-added service (VAS) development. The main players in the value network for developing the VASs will be content providers and 3rd-party service providers, the customer-facing service proder should provide the service delivery platform (SDP) to deliver these services, and to control the quality of service and the performance of the partners.

– For NGN services, it is necessary to distinguish two kinds of customers: the consumer customers and enterprise customers. The former is responsible for CGM (Customer Generated Messages) development, mash up and distribution supported by coordinator and contents/application providers; and the communications on implicit SLA with free charge pricing; and the latter is for software usage delivered on SaaS (Software as a Service)/PaaS (Pratform as a Service), developed on SOA supported by eTOM, TMN, ITIL, BPEL, UML, ERP, Web services, etc. and the communications on explicitly managed SLA.

– For NGN management it is important to know the managed objects (what should be managed), management subjects (who should manage what) and management target (for whom management be executed).

– To solve the management problem of NGNs and the Future Internet, it is necessary to replace the knowledge plane with the combination of a management plane and an inference plane. In such case an autonomic networking architecture will realise this approach and the result will enable the business to drive the services and resources supplied by the network as context changes.

– For the next generation operations and service management the optical control plane should enable large scale service deployments through the multi-faceted collaborations. The steps along the way include goals, architecture and value chain; identifying management, operational and integration challenges; agreeing on standards; tying in with research on future generation networks; and deploying services using the control plane paradigm.

8 APNOMS 2008 Best Paper Awards

The APNOMS 2008 organizing committee selected the top three papers presented in the technical session for the "Best Paper Award". Before the symposium nine nominees were selected with the highest review scores, and the award committee evaluated the nominees' presentations. The award committee finally selected three papers with the highest overall (paper and presentation) scores. Selected papers were "Layer 1 VPN NMS based on each VPN customer," by Hiroshi Matsuura and Naotaka Morita (NTT, Japan), "A Hop by Hop Rate Control Based QoS Management for Real Time Traffic in Wireless Sensor Networks," by Muhammad Monowar, Md. Obaidur Rahman, and Choong Seon Hong (Kyung Hee University, Korea), and "OD Count Estimation Based on Link Count Data," by Yi Jin,

Dongchen Jiang, Shuai Yuan, Jianting Cao, Lili Wang (Beihang University, China) and Gang Zhou (Beijing University of Aeronautics & Astronautics, China).

9 Concluding Remarks

In APNOMS 2008, the technical and short paper session papers were published in LNCS (Lecture Note in Computer Science) 4773 by Springer-Verlag. Also, a CD-ROM of the proceedings has been published, which includes all innovation session papers, and presentation materials of keynote speeches, and special sessions.

APNOMS 2008 was a very successful symposium. It was well attended and the feedback on all aspects of the symposium organization, in particular, on the technical program was very positive. It contributed to the growth of APNOMS into a very important international symposium as it was held in China for the first time in its history. The audience's feedback reinforced the positive aspects of the symposium: a good mixed participation from both industry and academia in technical contributions, the tradition of special sessions focusing on experiences and lessons learned by different countries in this region, excellent venue and social events, and the overall collaborative, interactive and friendly atmosphere of the symposium.

The keynote and DEP presentations as well as the pictures taken at the symposium are all available from the symposium website: http://www.apnoms.org/2008.

APNOMS 2009 will be held September 23–25, 2009 in Jeju Island, Korea. For more information, please visit http://www.apnoms.org/2009.

References

1. Hong, J.W.: Toward global network management. J. Netw. Syst. Manag. **6**(1), 91–93 (1998). Plenum Press
2. Ejiri, M., Park, J.T., Okazaki, H., Hong, J.W.: Managing the new telecommunications paradigms: a report on APNOMS 98. J. Netw. Syst. Manag. **6**(4), 487–500 (1998). Plenum Press
3. Cho, Y.H., Tokunaga, H., Hong, J.W., Chujo, T.: Meeting the challenge in end-to-end service management: a report on APNOMS 99. J. Netw. Syst. Manag. **7**(4), 495–498 (1999). Plenum Press
4. Tomo Taniguchi.: "A report on APNOMS 2000," global communications newsletter, IEEE Commun. Mag. **39**(5), May (2001)
5. Chen, G., Caradharajan, V., Ray, P., Zuluaga, P.: Management for eBusiness in the new millennium. J. Netw. Syst. Manag. **10**(2), 255–259 (2002). Plenum Press
6. Kim, S., Suda, K., Hong, C.S., Kiriha, Y.: Integrated management for telecommunication solutions - process, OSS and technology. J. Netw. Syst. Manag. **10**(4), 531–535 (2002). Plenum Press
7. Mase, K., Ahn, I.S., Fujii, N., Shim, Y.C.: Managing pervasive computing and ubiquitous communications. J. Netw. Syst. Manag. **11**(4), 505–509 (2003). Springer
8. Fujii, N., Hong, J., Uno, H., Lee, K.-H.: Toward managed ubiquitous information society, APNOMS 2005 Report. http://www.apnoms.org. Accessed Sept 2005
9. Hong, J., Kuriyama, H., Kim, Y.-T., Takano, M.: Management of convergence networks and services: a report on APNOMS 2006. J. Netw. Syst. Manag. **14**(4), 603–608 (2006). Springer

10. Kuriyama, H., Lee, K.-H., Kuo, G.S., Ata, S., Hong, C.S.: Managing next generation networks and services: a report on APNOMS 2007. J. Netw. Syst. Manag. **16**(1), 113–119 (2008). Springer

Author Biographies

James Won-Ki Hong is Dean of Graduate School for Information Technology and professor in the Department of Computer Science and Engineering, POSTECH, Pohang, Korea. He received a Ph.D. degree from the University of Waterloo, Canada in 1991. His research interests include manageability of Future Internet, network and systems management, distributed computing, and network monitoring and analysis. He was the General Chair for APNOMS 2006 and General Co-Chair for APNOMS 2008.

Luoming Meng is Director of the State Key Laboratory of Networking and Switching, and Deputy Chair of the BUPT Academic Committee. He has been engaged in research on the telecommunication networks, network management, and telecommunication software. Among the completed projects, seven of them were accepted as ITU-T standards, and two have resulted in the National Science and Technology Progress Awards in China. Now he is Chairman of Network Management Technical Committee, CCSA and Chairman of Telecommunication Software Committee, CIC.

Young-Tak Kim is a professor at Yeungnam University, Korea. He received ME and Ph.D. degrees from KAIST in 1986 and 1990, respectively. He had worked at Korea Telecom for 4.5 years, and in 2001 and 2008 he worked as a visiting scholar at NIST, USA. Since May 2005, he has been working as the Technical Program Chair of IEEE CNOM. His topics of research interests include QoS-aware traffic engineering, network operations and management, scalable routing and addressing in next generation network, and seamless and secure mobility in broadband convergence network.

Hiroshi Uno is an Executive Research Manager of NTT Access Network Service Systems Lab. He received BS, MS and Ph.D. degrees from Nippon University, Japan in 1982, 1984 and 2004, respectively. His research areas are access network systems and operations. He was an invited professor of Soochow University in China in 2004, and a consultant professor of Huazhong University of Science and Technology in China in 2005 and 2006. He is a member of IEEE and IEICE, Japan. He is a chair of the Technical Committee on Information and Communication Management, IEICE.

Shingo Ata is an associate professor in the Graduate School of Engineering at Osaka City University, Japan. He received ME and Ph.D. degrees in Informatics and Mathematical Science from Osaka University in 1998 and 2000, respectively. His research works include networking architecture, design of communication protocols, and performance modeling on communication networks. He is a member of the IEEE, IEICE and ACM.

Yan Ma is a professor of Beijing University of Posts and Telecommunications and a Technical Committee member of the China Education and Research Network (CERNET and CNGI-CERNET2). He has done consulting work for telecoms in China for many years. For APNOMS, he was the Special Session Co-chair in 2007 and Technical Program Co-chair in 2008.

Deokjai Choi is a professor of Electronics and Computer Engineering at Chonnam National University, Korea. He received BS and MS degrees in Computer Engineering at Seoul National University and Computer Sciences at KAIST respectively. He received Ph. D. degree in Computer Science and Telecommunication program at University of Missouri-Kansas City. His research works include network management, sensor network, and context aware systems.